centralized service bureau CAMLS network server system. Turning to a concrete example, the access to the options for conversion of other geographical data is the lock opened and closed i.e. enabled or disabled by the key. While communications links are being maintained, the options selector **215** is controlled from a remote, central service bureau to switch on and off certain other geographic data conversion routines. Or a suppressed conversion routine can be unlocked by a user entered password or a digital key as supplied on tangible media.

An alternative embodiment meters or measures the extent or duration of the end user's usage of the selected optional other geographic data conversion routines for purposes of assessing a usage fee. Metering can be done remotely when communications links are involved in the downloading of supplemental functions or map data. Internal metering on stand alone devices consists of some digital accounting and reporting subprogram for tracking the extent or duration of usage accessed by a key password or code. With respect to the objectives of interoperability and communications, these features of the CAMLS invention permit switching on and off optional CAMLS capabilities in the field, along with metering or accounting for the duration or extent of usage.

As shown in FIG. **9**, another point of access or gateway for remote control, for keys and for metering usage inheres in steps **109**, **119** and **129**. These steps work to initiate or bypass i.e. enable or disable typing operations ultimately determinative of whether raw data packets of certain types are incorporated into CAMLS software and its standard data structures. Also, at step **105**, a critical identification is made of the origin of each raw data packet or input event without which all further data processing or display within the CAMLS software would be largely impossible. Step **105**, therefore also has potential as a lock requiring some form of key. Moreover, Step **105** forms a gateway at which inputs from particular input devices can be metered as well as enabled and disabled, for implementing a "fee for service" information distribution and support system.

An example tree data structure relating the grid quadrangles of different grid levels is illustrated in FIG. **12**. In the example of FIG. **12**, a quadtree data structure is used to relate the different levels. Of course other tree structures can be used such as hextrees and octaltrees. Another example of a quadtree data structure is set forth in applicant's U.S. Pat. Nos. 4,972,319 and 5,030,117 referred to above. In the quadtree example of FIG. **12**, each grid quadrangle is divided into 4 descendant grid quadrangle at the next grid level below. Four grid quadrangles compose a single ancestor grid quadrangle in the next grid level above.

In order to shift or scroll to an adjacent grid quadrangle at the same grid level, the user or other input source merely specifies the unique name of one of the adjacent grid quadrangles and the shift is completed as set forth in the flow chart of FIG. **11**. To zoom down to a greater level of detail the user or other input source specifies one of the descendant grid quadrangles at the lower level. Or, the data subsystem calculates and determines the appropriate applicable descendant grid quadrangle according to the user location, location of a specified loc/object, etc. To zoom up to a higher grid level for a larger perspective but lesser detail, the user or other input source can specify either the page number in which the current grid quadrangle is an ingredient element or the unique name of the ancestor grid quadrangle if known. Yet a fourth tree level is also shown in the quad-tree structure of FIG. **12** providing detailed local level or metro level grid quadrangles.

By way of example, a Country Atlas can be prepared at a first scale of 1:3.2M with grid quadrangles of a first level grid at a regional scale. A set of Country Regional Atlases can be prepared at a second scale of 1:800K with grid quadrangles of a second level grid at a subregional or state scale. Finally, a set of Metro Atlases can be prepared at a third scale of 1:200K with grid quadrangles of a third level grid at a local scale. In this example the grid levels are related in a hexadecimal tree data structure. Alternatively the grid levels may be viewed as related in a quadtree structure but selecting only every other generation in the quadtree.

According to various alternative embodiments of the invention, reference is made to FIGS. **1–3**. In each of the embodiments of FIGS. **1–3** a personal digital assistant PDA **15** incorporates a digital computer dimension in association with a printed map **14** and atlas **10**. According to one alternative embodiment, the PDA **15** can be constructed with a transparent or "see through" screen **18**. Such a see through screen is available for example from Bosch Telecom of Germany under the trademark TELDIX (TM). In the preferred alternative embodiment the dimensions of the transparent screen **18** coincide with the dimensions of the grid quadrangles of the grid printed over the printed map **14**. Grid quadrangles displayed on the screen **18** of PDA **15** therefore coincide in dimensions with the grid quadrangles of the printed map **14**. With the see through screen, PDA **15** can be placed directly on the printed map **14**. The grid quadrangle on display **18** can be aligned with the corresponding grid quadrangle on printed map **14** identified by unique name on the alphanumeric line display shown variously in FIGS. **1**, **1**C, **2**, **3**, and **3**A. By this physical arrangement, the display of the location **28** of a loc/object or user location on the PDA screen **18** can be precisely correlated with a location on the corresponding grid quadrangle of the printed map **14**.

According to another alternative embodiment, the graphic screen display **18** of the PDA **15** may not be used at all or may be replaced with a speaker for voice output. According to this alternative embodiment, the outputs provided by PDA **15** are a voice output sounding the name of a uniquely named grid quadrangle or an alphanumeric line display or text line display setting forth the unique name of an identified grid quadrangle as shown by way of example in FIGS. **1**, **1**C, **2**, **3**, and **3**A. Step **445** provides text display or voice output of related information.

Thus the user might enter a query in PDA **15** "Where is Freeport, Me.?" or "Where is the Blue Onion Restaurant?". In response to this query the PDA **15** addresses the appropriate database, available, for example on PCMCIA cards or other database sources on memory devices, wired data links, or wireless data links and identifies the pertinent grid quadrangle at the PDA computer outputs. The unique name of the grid quadrangle is sounded by the voice output or displayed on the alphanumeric line display. Referring to the corresponding grid quadrangle on the printed map **14**, the location of Freeport, Maine can be readily identified. With respect to the Blue Onion Restaurant, additional queries may be posed by the user operating within the selected grid quadrangle to obtain address location, current specials for the day, and other pertinent information afforded the traveler.

As previously noted the printed maps may take the form not only of paper maps and other sheet media presentations, but also projections from the printed map or other sheet media. For example, a wall map can be provided at an enlarged scale by suitable projection optics, for example for tracking fleets of vehicles. According to another example as shown in FIG. **13**, an enlarged printed map **80** on paper, transparent sheet, or other light transmissive medium can be back lighted by a light box **82** covering the area of the map